

Winter Raptor Survey Grows and Datasets Getting Larger

PHOTO (see end)

Overview

Car-based winter raptor surveys have engaged a subset of HMANA members since at least the 1990s, and our database holds records for surveys that date back to the 2004-'05 season. The first surveys in our project were conducted in the states of Pennsylvania and Illinois, each of which remains a stronghold for winter raptor survey participation. Our project is important and unique as its scope is the whole North American continent. The Winter Raptor Survey committee envisages our winter counting will provoke questions and answers about the ecology of raptor species that remain in North America over our winter months, and be used in research to direct conservation actions. In this article, I review HMANA's WRS project, with a focus on the 2019-20 season.

Project Extent

HMANA's electronic database, developed by Jason Sodergren, of Homer, AL, holds records for 64 WRS routes across 23 states. These represent the efforts of 221 members and non-members over 16 years. Between 2018-19 and 2019-20 we experienced growth in participation and geographic scope, with more than 53 volunteers driving 32 routes in 13 states last winter. Most participants conduct surveys along only one route, but a number ran more than one route – up to as many as four - and many routes were surveyed more than once, typically by the same people each time. For practical reasons and consistency of effort, the WRS committee (“we”) encourage people to survey in groups of 2-4, but a number of routes were surveyed by a single person, and a couple were reported to be large-group efforts, with exact numbers and identities unspecified. Illinois remains the best-represented state, with 12 different routes run by 17 people in the target months last winter.

We were grateful to retain most existing volunteers in the past season, and to receive survey results from new participants representing eight new routes and an expansion into three more states: New Hampshire, Colorado and Nevada. Volunteers in Kansas, Ohio and Pennsylvania who surveyed along three different routes in 2018-19 did not enter results for this past season, but we hope to see that they did continue last winter, and are just behind on data entry, or that they are able to resume next year.

Eight states currently have just one active route each. The Midwest region has the most states with active routes; volunteers in Minnesota, Iowa and Illinois participated last season. Last winter, three routes were initiated in New England, including one in southern New Hampshire - conducted by a couple and their two young children, who were lauded as good spotters – and the project's very first-coastal routes, performed in Massachusetts by a long-time migration hawk counter.

Seven routes have been surveyed continuously for 10 or more years, five of which are in Illinois. In 2019-20, a mother-son duo performed the 16th annual surveys for two routes, in McHenry and Lake Counties, resp. Another pair surveyed a route in the state's Dekalb-Ogle-Lee Counties for their 14th season, while additional Illinois volunteers ran surveys for the 12th (Ogle-Lee Counties) and 11th (Wedron) consecutive years, respectively. Three participants in California performed the 13th annual survey of their route in the Coyote Valley. Dodge County in Nebraska has also been surveyed for 13 consecutive seasons. In December, one of the Illinois pairs initiated a new survey in Colorado, providing our very first data for that state. Two volunteers initiated a new survey for our project in Washoe County, Nevada, with this route being distinguished as one of only two for the West, at present.

States that are currently unrepresented but have previously had at least one survey route are Maine, Vermont, North Carolina, Ohio, Missouri, Louisiana, Kansas, Montana, Utah and Washington. These apparently inactive routes were surveyed for as long as eight years and as recently as two seasons ago. States that currently are surveyed but previously had greater coverage are led by Illinois (the greatest number), joined by New York, Pennsylvania, Iowa, Nebraska, and California. The latter group includes routes surveyed as many as nine seasons, and as recently as two years ago.

New in 2019-20

Since our project's inception, the basics of our protocol have remained the same: we ask volunteers to document all raptors observed while driving a consistent route, in the same direction each time, during the winter months. Over the years, the WRS committee has tweaked the guidelines, with changes for this past season representing continuing efforts to increase standardization and to more readily provide habitat associations for birds that are found. Last fall, we explicitly defined the target survey period as December 1st through the end of February. Though pre-existing routes habitually surveyed earlier and later than this may continue to be reported, we asked new participants to hold to the core winter period. This reflects our desire to focus on raptors' wintering ecology – discovering and documenting where diurnal birds of prey occur in the continental US during the non-breeding season – and our recognition that fall migration extends into December, with spring movements possible even in February. A second modification this past season was to ask that any stops for scanning be pre-ordained and thereafter consistently used. Additional stops to confirm a spotted bird's identity and/or to enter the observation's details are still likely to vary between surveys along a given route.

The bigger change for the last season was a switch from documenting the cardinal direction and estimated distance of each bird relative to the vehicle, to instead requesting up to four habitat designations be provided for birds observed. This component has been included as an optional data element, to flexibly apply either to some birds in a survey or all, according to personal preference. The committee felt that characterizing birds' immediate habitats might be less time consuming, better facilitate understanding of birds' needs, explain changes in their numbers, and guide conservation actions. On the other hand, we recognized there may be barriers to including habitat descriptors for every bird. When snow cover is present, it may not be possible to accurately identify the state of an agricultural field, or even to differentiate a field under cultivation from a meadow or wetland. Topography can obscure a bird's immediate surroundings, and a soaring or distant bird's environment may be unclear. Inclusion of habitat descriptors may also feel like a burden for volunteers who can't safely stop or whose route lengths make prolonging the survey to gather and document these data undesirable. Our classification includes multiple subtypes of agricultural habitat, because use of land for agriculture can vary greatly from one year to the next, this affects its wildlife values, and financial incentives from federal or regional sources can modify farmers' land use. As people began using the habitat designations, it became apparent that some revisions were indicated, so we are rolling out an improved set of designations for the coming season (summarized in Table 1).

Last fall we posted a short slideshow on the HMANA website that succinctly presents our current guidelines to existing participants and potential new surveyors, and complements the protocol document. We anticipate there will be an additional visual presentation that provides examples of applying habitat descriptors, by the time this article has gone to press.

Results From the 2019-20 Season and Discussion

Volunteers counted 2,723 birds representing 20 species of diurnal birds of prey last year, between December 1 and February 29. Routes were surveyed between one and four times during this period, with a median of three surveys per route in those three months. Many of the volunteers who performed the most multiples during this period also ran their routes before and after the core winter period. The date range for surveys conducted only once over the season was December 7 through February 22, with a median of January 11. Table 2 shows a broad summary about all routes surveyed during the target period. For routes surveyed more than once, totals represent the high counts for each species rather than the total of birds from all surveys. The maximum total number of individual diurnal raptors identified to species level was 2,080 birds – assuming the same birds weren't counted on more than one route, which may not be the case for Illinois, where routes can be close to each other or even overlap. Owls are not included in the summary, though some were counted.

Looking at all surveys for the target period, pace varied widely, in some instances more than two-fold for successively conducted surveys of the same route. Routes varied in length from 11.5 miles (Shawangunk Grasslands NWR, NY) to 100 miles (National Aviary 2 Pymatuning and Pittsburgh-Hartstown, both in PA) with a median of 48.5 miles (Pine Island area, NY). Survey duration varied from 1:10 (Woodford North, IL) to 8:40 (Palm Beach-Hendry County, FL), with a median of 4:10 (four routes: two in PA; one in NY; and one in Illinois). There was a huge range for number of birds observed per hour, from a low of 0.4 birds/hr in Dodge County, NE to a high of 103.8 birds/hr along the Florida route. The median was 5.1 birds/hr, exemplified by routes in the Pine Island, NY area and near the LaSalle County nuclear plant in Illinois. Total numbers counted per route varied from 4 (Western Blue Earth County, MN) to 900 (Palm Beach-Hendry County, FL), with a median of 22.5 (Lasalle County nuclear plant, IL, Pine Island area, NY and Dutchess County, NY).

Species considerably leading the pack of 2,080 unique birds were Turkey Vultures (39%) and Red-tailed Hawks (26%), followed by Bald Eagles (11%) and American Kestrels (9%). Seen in smaller numbers were Northern Harriers (4%), Black Vultures (3%), Rough-legged, Red-shouldered, and Cooper's Hawks, and Osprey (1% each). Birds least often found were Crested Caracaras, Golden Eagles, Swainson's Hawks, Merlins, Peregrine Falcons, Sharp-shinned Hawks, White-tailed Kites, Ferruginous Hawks, Snail Kites, Northern Goshawks, and raptors not identified to species level (all <1%).

Many raptors were found in twos, especially Red-tailed Hawks and Bald Eagles, and in repeated instances, these were documented as both being adults, sometimes further identified as a female and a male adult pair. Once an adult and an immature Bald Eagle were documented on the same tree branch (Marshall Putnam, IL on January 20), and in Massachusetts two immature Bald Eagles were seen close to each other (Essex County, MA – Rte. 2, December 8).

All participants specified whether their sightings were of perched, flying or soaring birds at least some of the time, but sometimes in the Notes section rather than by use of the pulldown menu. In most surveys this location information was provided for most or all birds found.

Slightly more birds were recorded as perched compared to the combined categories of flying or soaring (1,333 vs 1,105). Species identified overwhelmingly as perched compared to the two flying descriptors were two buteos - Red-tailed Hawks (595:251) and Red-shouldered Hawks (17:5) - and our smallest falcon, American Kestrels (203:41). Birds predominantly noted as flying compared to combined numbers for perched and soaring were both vulture species (Black, 28:5; Turkey 699:21) and Northern Harriers (87:16). Approximately evenly split between perched and the two flying categories combined were Ospreys, Bald Eagles, Rough-legged Hawks, Golden Eagles, Crested Caracaras, Sharp-shinned and Cooper's Hawks. Only 57 sightings of six species were reported as soaring: Turkey Vultures; Bald Eagles; Northern Harriers; Sharp-shinned Hawks; Red-tailed Hawks; and Golden Eagles. In Coyote Valley, CA, two red shouldered were identified by voice alone, amongst birds tallied that lacked a designation of perched, flying or soaring.

Questions that the perched, flying and soaring distinctions can answer include whether behavior affects detectability, and whether there's an association between ambient conditions – weather, climate, snow cover - and behavior. Stationary birds may be missed more often than ones that are moving. High, soaring birds may be more obvious - or more likely to be missed, if surveyors aren't looking up high enough. Volunteers are asked to avoid surveying during unfavorable weather, but sometimes weather turns, and climate change means changes in snow cover, temperatures, and the presence of rising air columns that support soaring. Differences in snow cover and other climate and weather factors can affect prey availability, which may affect how much time birds must devote to hunting, and when they start to migrate or breed.

The new, optional habitat descriptors were provided for at least some birds observed along 78% (25/32) of the routes surveyed in the three months of last winter. Many surveyors provided at least one descriptor for every bird they found, and a few surveyors entered as many as four descriptors for the 100m closest to some raptors. The classification we provided included 10 specific designations- comprised of one cluster of five agricultural habitat subtypes and five other categories - and an 11th, Other. The most commonly used designations were in the agricultural cluster: Stubble, Green, Fallow, Dirt, and Unspecified, in descending order of frequency. The next-most cited habitat in which a raptor was found (when specified) was Water (wetland/pond/marsh/riparian) and then Forest (inc. woodlots), followed by human Development (structures additional to the road itself and usual roadside powerlines).

Examples for the meaning of Other that were provided in the Notes included the bird was in trees between fields (but not really a wooded site), or right above a road or interchange. We expect the amended classification that applies going forward – consisting of more different agricultural subtypes (adding Hayfields and Animal agriculture to the Agriculture cluster) and several new categories (Shrub-/scrublands, Roadsides and Desert) - will improve participants' abilities to more accurately designate habitats for birds sighted, using a consistent schema. (Roadsides was suggested for instances when the bird appeared to be not only close to but also using such an area for perching or hunting.)

Surveyors used the Notes section to provide a variety of kinds of additional information. Most commonly this related to location or behavior, but sometimes species morph was indicated. Behaviors recorded here included hunting or eating prey, kiting and hovering – types of hunting flight not specified in our dropdown list – and chasing or being chased by another bird. Birds were often seen in twos, mainly red tails but also Turkey Vultures, Bald Eagles, and kestrels. Territorial behavior described included perching near a nest (Bald Eagle, McHenry County, IL on January 6) or on one. Breeding behaviors were witnessed, including a leg-dangling courtship display (Red-tailed Hawks, Coyote Valley, CA on Feb 7), copulation (red tails in Dutchess County, NY, on Feb 3) carrying nest material (a Bald Eagle on the Sax-Zim Bog, MN route, on February 28) and sitting on nests (a red tail, Wedron 201314, IL on Feb 7; Bald Eagles, Hudson River, Bear Mountain Bridge to Croton, New York on Feb 15). Surveyors on one route specified they thought a bird was sitting on eggs (Bald Eagle, McHenry County, IL on Feb 20).

Trends for Oldest Routes

For routes that have been surveyed over more extended periods, we can look for count trends. The only statistically significant count trend found in our datasets longer than 10 years was a rise in Turkey Vultures observed over the last 13 seasons in California's Coyote Valley ($R^2=0.63$ [95% confidence interval 0.36-0.98]; Figure 1), during early February. A pair of volunteers have found 12 species in total since this survey's inception, but Red-tailed Hawks and Turkey Vultures dominate. What could this increase reflect? Perhaps there are greater numbers of all-year-round birds in Coyote Valley. Local habitats may be becoming more attractive, or other landscapes may have been deteriorating. Populations

that breed to the north and winter in Coyote Valley may have had population increases. Other factors could be that Turkey Vultures migrating south are stopping short of their previous wintering areas, or that surveyors are seeing earlier returnees, of locally-breeding or more-northerly breeding birds.

The Coyote Valley route shows no trend for red tail numbers, but there may be a weak association of Northern Harrier counts with year ($R^2=0.43$ [0.09-0.77]; Figure 2). Harrier counts used to be 1s and 2s, and in recent years have been 1s and zeros.

For the last 13 winters, Dodge County, Nebraska has been surveyed by the same two people, with an occasional third observer. The most numerous species are Red-tailed Hawks, Bald Eagles and American Kestrels, and counts show no trends.

Bald Eagle counts may have a weak correlation with year in Illinois winter surveys northwest of Chicago and West of Lake Michigan, for both the McHenry County route alone or combined with the Lake County route ($R^2=0.4$ [0.07-0.73] and $R^2=0.42$ [0.10-0.74], resp.; Figures 3 and 4), but not for Lake County alone. Numbers are small, but in the early years of this period no eagles were found there, and the 1, 2, or 3 birds found in recent surveys are all more than zero. There is no count trend for American Kestrels over consecutive winter surveys along four IL routes monitored for the last 11-14 years when examined separately, or when the last 11 annual February counts are combined for all four routes. Red tail counts show no trend over the last 11-16 years in Illinois whether looked at for four different individual or combined routes, combining or separately analyzing winter months for a given route. (Counts for the fifth long-term Illinois route were not analyzed as its stretch overlaps with another long-term route which has more miles.)

In our project only Florida and Louisiana routes (the latter currently inactive) have found Osprey in winter, so far. As obligate fish eaters, they are rare in winter where water is likely to be frozen, but small numbers can winter in northern areas. Among states where we currently have active survey routes, Pennsylvania, New York and New England routes are most likely to yield Osprey sightings. Illinois has not yet seen recovery of its Osprey population since the DDT era, however, a hacking project managed by researchers from the University of Illinois at Springfield since 2013 has been trying to enhance the breeding population of Ospreys in Illinois. Hacking locations are south of currently active routes, at Banner Marsh State Fish and Wildlife Area, Anderson Lake and Lake Shelbyville. The more northerly routes may find Osprey in future surveys, and new routes in the vicinities of the hacking project may pick up these re-introduced birds late to migrate, early to return – or too confused to migrate. As a case in point, on December 3, 2019, an eBirder reported seeing an immature Osprey in Lewistown, between Banner Marsh and Lake Anderson.

Summary/Looking Ahead

The HMANA WRS continues to attract new participants, and consistent counting by returning participants around the same time of year every year is providing larger datasets for study, some of which seem to be showing count trends. As of July, 2020, we are anticipating the late entry of 2019-20 observations for a survey from New Mexico, which will represent our first in that state.

WRS data that volunteers have contributed can be examined to look at count trends and many other questions. Our WRS habitat data are ripe for analysis. Important landscape associations are likely to be apparent by examining observations over single or multiple routes for even a single year, and could help guide actions that support raptors. Sites can be identified that are priorities for local conservation programs or the USDA's Conservation Reserve Program and its Conservation Reserve Enhancement Program, which compensate farmers for modifications of land use or the removal of fields from production to benefit wildlife.

Since windfarms and solar array fields are likely to explode across the country in coming years, routes that are established before such developments are in place or expand, and continue afterwards, will be important tools for us to examine their wildlife impacts. Weather data can be considered as a factor that alters species counts even when the number of birds is constant – for example, warmer weather may favor soaring, which can alter the detectability of birds. Climate change - its proxies in our data being temperature and snow cover - may also change counts because of changes in population numbers in a geography. Survey pace and number of observers can be compared to counts and see if these variables seem to affect results.

Greater geographic coverage of our WRS project is an important goal for improving the utility of findings from our datasets. Expansion can be achieved by HMANA members and others re-activating routes surveyed in the past, and the addition of new routes by existing participants or new volunteers. The WRS committee understands that circumstances sometimes impose obstacles for continuing to survey a previously-established route. In these instances, we encourage participants to seek fill-ins or others willing to take over. Possibilities include people performing other HMANA WRS in the state, and new volunteers within local or state bird clubs. Where there is a local hawkwatch, the site coordinator listed on the Hawkcount website may be interested to help, or able to suggest other skilled and available parties. Hawk watchers who may be willing to resume surveying an inactive route can contact the WRS committee regarding this interest, and we can try to put you in touch with that route's founder.

Whether population counts are stable, rising, or falling, or landscape use or migration phenology are changing, we may better understand raptor ecology - and be able to apply knowledge to conservation - when WRS findings are combined with those from migration counts and other bird studies.

There are state-based groups and conservation non-profits in North America and on other continents that conduct winter raptor surveys with protocols that differ from ours and each other. Recognizing that collaboration between groups could strengthen these disparate efforts, the Peregrine Fund's Director of Global Conservation Science, Chris McClure, approached HMANA in the fall of 2019. Dr McClure is interested to consider the viability of eventually pooling any of these efforts, which could mean a set of shared, basic survey elements, a single protocol, and/or a database that holds common survey elements from more than one group. The members of the WRS committee are excited about the potentials of such collaboration, and we assure volunteers that any such major changes would reflect your input, and changes in data handling would require route leaders' consents. (If you are involved in the WRS and have not been getting a committee email a couple times a year or more, please contact us with your current email address!)

We encourage you to present our WRS project to your friends and contacts, bird clubs and naturalist societies, and to offer the slideshows available on our hmana.org website as a platform, if desired. These activities support our education goals and may net us new WR surveyors for existing, re-activated or altogether new routes. If you know of researchers for whom our data may be of interest, please point them to our website. Here they can review findings from years of contributions made about raptor species wintering across the United States, and may follow our data release policies to share information from this project with wider audiences, for purposes of education and conservation.

-Nora E. Hanke, with gratitude and credit to all surveyors, especially from last season, for their inputs on the project, time in the field, and performance of data entry.

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Rough-legged Hawk (Steve Walter)

Table 1: Summary of Optional Habitat Designations (up to four per sighting)

Category	Subtypes or Description
Agriculture	AgD (dirt), AgF (fallow), AgG (green), AgH (hayfields), AgA (animal), AgS (stubble), AgU (unspecified)
Burn	Active or recent fire
Development	Buildings, Energy infrastructure
Forest	Woodlands, edges, woodlots
Shrubland	Scrub, thickets
Grassland	Native grassy areas, prairie, savannah
Water	Natural or human-made water bodies, conduits, flooded areas, wetlands
Roads	Roadsides (to apply when raptor using roadside)
Desert	Desert with or w/out shrubs
Other	Please describe in Notes section

Table 2: Participation, Species and States' Counts for 2019-20 Season Winter Raptor Surveys*

State	No. of Routes	Route Name (max. no. of consecutive years)	No. of Volunteers	Species**	No. of Birds***
New Hampshire	1	Ct River Cheshire Cty (1)	4 (inc. 2 children)	RT, BE, SS, CH	16
Massachusetts	3	Essex Cty – 1 & 2 (1@); Ct River Valley (5)	4	RT, BE, NH, SS, CH, RL, PF	59
New York	5	Hudson River (3); Dutchess Cty (1); Pine Island (3); Shawangunk Grasslands NWR (3); Black Dirt-Wallkill NY/NJ (4)	7	RT, TV, BE, BV, NH, CH, RL, AK, SS, RS, ML, PF, GE	310
Florida	1	Palm Beach Hendry Cty (3)	1	TV, AK, NH, RT, RS, OS, CC, BV, SW, BE, WK, CH, PF, SN	900
Pennsylvania	2	Nat'l Aviary (1); Pittsburgh-Hartstown (1)	1 + up to 40 in buses	RT, BE, RS, AK	31
Illinois	12	Dekalb-Ogle-Lee (14), Goose Lake (6); Lake Cty (16); LaSalle Nuke Plant (7); Marshall-Putnam (7); McHenry Cty (16); Ogle Lee L (12); Rt 4714 (3); Wedron 201314 (11); Woodford North (7); Woodford Cty (2 routes) (7@)	17	RT, BE, AK, NH, RL, CH, TV, PF, ML, GE	396
Minnesota	2	Sax-Sim Bog IBA (5); Western Blue Earth Cty (1)	4	BE, RL, RT, NG, AK	21
Iowa	1	SW Ringgold Cty (6)	4	RT, BE, AK, NH, RL, CH	61
Nebraska	2	Dodge Cty (13); Washington-Burt (4)	4	RT, BE, AK, CH, RL, NH, ML	105
Colorado	1	CO 176 (1)	2	RT, AK, GE, FH, RL, BE, ML	38
Nevada	1	Washoe Cty (1)	2	RT, AK, NH, GE, CH, RS, SS	40
California	1	Coyote Valley (13)	3	TV, RT, RS, NH, WK, AK, ML, GE	103

* Between December 1 and February 29

**Listed by descending counts and taxonomy. BV Black Vulture, TV Turkey Vulture, OS Osprey, WK White-tailed Kite, GE Golden Eagle, NH Northern Harrier, SS Sharp-shinned Hawk, CH Cooper's Hawk, NG Northern Goshawk, BE Bald Eagle, SN Snail Kite, RS Red-shouldered Hawk, SW Swainson's Hawk, RT Red-tailed Hawk, RL Rough-legged Hawk, FH Ferruginous Hawk, CC Crested Caracara, AK American Kestrel, ML Merlin, PF Peregrine Falcon
Diurnal raptors only.

*** For routes surveyed more than once in period, the high count for each species was used, rather than the total of multiple surveys. Diurnal raptors only.

Figure 1: Turkey Vulture Counts in Coyote Valley, CA, Februarys, 2008-2020

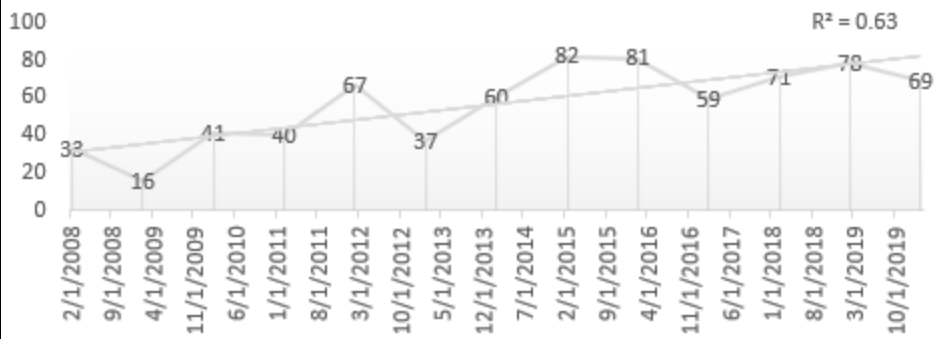


Figure 2: Northern Harrier Counts for Coyote Valley, CA, Februarys, 2008-2020

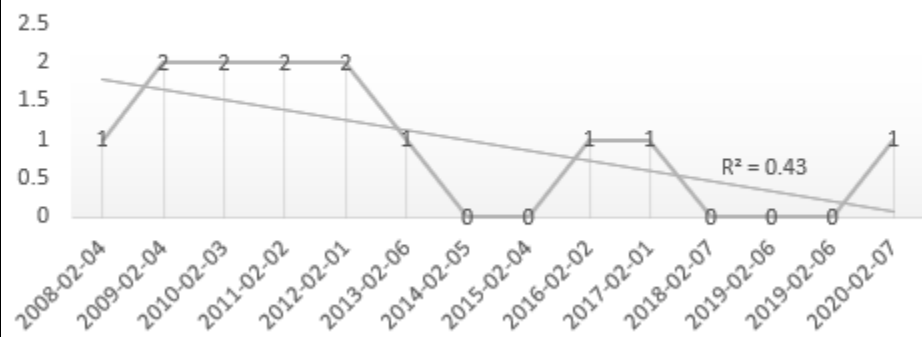


Figure 3: February Bald Eagle Counts in McHenry County, IL, 2005-2020

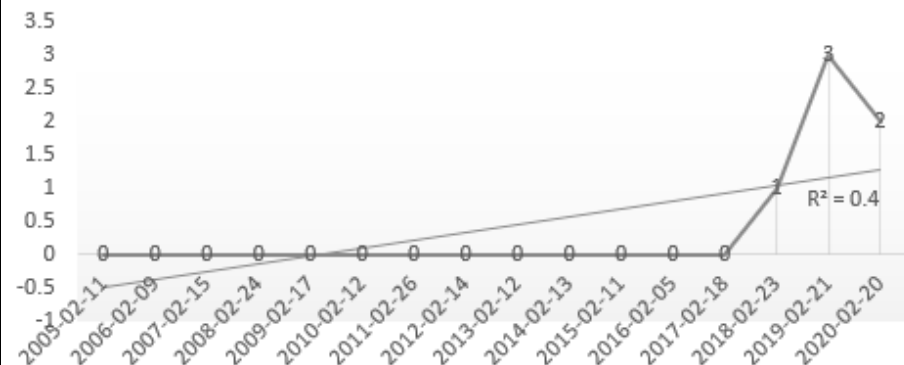


Figure 4: Combined February Bald Eagle Counts, Lake & McHenry Counties, IL 2005-2020

